



OMG Webinar Series

Interoperability Across Blockchain Ecosystems

Wednesday, January 22, 2020

8am pacific/11am eastern/4pm UK

Speakers



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About OMG



Founded 1989



International standards development organization



225+ specifications



325+ member organizations worldwide



11 specifications ratified as ISO standards

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OMG Vertical Markets

Standards are developed by OMG using a mature, worldwide, open development process. With more than 25 years of standards work, the OMG one-organization, one-vote policy ensures that every vendor and end-user, large and small, has an effective voice in the process.

Finance



Government



Healthcare



Manufacturing



Military



Retail



Robotics



Space Exploration



Who are OMGers?



For More Information

- **Upcoming OMG Technical Meeting**
 - March 23-27. 2020, Reston, VA, USA
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Interoperability across Blockchain Ecosystems

Object Management Group

22 January 2020

Blockchain Interoperability Concerns

- Retail community concerns
 - What happens when supply chain participants use different DLTs?
- Complex supply chains
 - Information passes between several participants (e.g. growers, wholesalers, retailers)
 - Any one of those may use one or another blockchain / DLT service in some way
 - Overall supply chain participants have little knowledge or expertise in this area
 - How does this effect integration, data integrity, confidence etc.?

Blockchain Interoperability RFI Scope

- Retail supply chains
- Manufacturing supply chains e.g. aerospace
- Scope extended to supply chain generally
- Other complex information chains (finance, insurance, media etc.) where data manufacturing crosses unit and organizational boundaries
- Blockchain interoperability generally

Blockchain Interoperability Research by OMG Community

- Consider different 'levels' like OSI 7-layer model
 - Extend by analogy to Blockchain
- Identified 5-step Data Framework
 - Based on kinds of data used in financial services
 - Generalized for kinds of data generally
- Heard from a range of providers of interoperability solutions
 - Seeing a wide range from common semantics to identifiers
 - Including bridge-like solutions

RFI Structure

- Allows for different kinds of structure in the responses (all optional):
 - N-Layer model
 - 5-part data structure
 - Modes of Interoperability (touch points)
- Potential solutions we have seen to date
- Two kinds of response envisaged:
 - People who own the problem
 - People who own some kind of solution

The Shape of the DLT Interoperability RFI

- Structure
 - Kinds of interoperability / touch points
 - Abstraction layers
 - Data 'Steps'
- Touch points:
 - Identifiers
 - Semantics
 - Machines participating in >1 DLT network
 - Use of 'oracles' as common touch point
 - Smart contracts interaction

OSI 7-Layer Model

OSI model				
Layer		Protocol data unit (PDU)	Function ^[6]	
Host layers	7	Application	Data	High-level APIs, including resource sharing, remote file access
	6	Presentation		Translation of data between a networking service and an application; including character encoding, data compression and encryption/decryption
	5	Session		Managing communication sessions, i.e. continuous exchange of information in the form of multiple back-and-forth transmissions between two nodes
	4	Transport	Segment, Datagram	Reliable transmission of data segments between points on a network, including segmentation, acknowledgement and multiplexing
Media layers	3	Network	Packet	Structuring and managing a multi-node network, including addressing, routing and traffic control
	2	Data link	Frame	Reliable transmission of data frames between two nodes connected by a physical layer
	1	Physical	Symbol	Transmission and reception of raw bit streams over a physical medium

Example: IOTA 7-Layer Protocol

	IOTA Protocol Stack	OSI Layers	Common Centralized Standards
Host Layers	Data Insights – Marketplaces & Commons –	Application	HTTP, FTP, IRC, SSH, DNS
	Data Processing – Qubic & AI Libraries–	Presentation	SSL, FTP, IMAP, SSH
	Data Structuring – MAM, DID Org, IAC –	Session	APIs, Sockets
	Data Consensus – Bundles –	Transport	TCP, UDP, ECN, SCTP, DCCP
Media Layers	Data Packetization – Transactions –	Network	IP, IPSec, ICMP, IGMP
	Data Aggregation – Azimuth, DID Device – Protocols = Ethernet, RF, Fiber, Satellite	Data Link	MAC, Ethernet, SLIP, PPP, FDDI
	Data Delivery Medium = COAX, Fiber, Wireless	Physical	COAX, Fiber, Wireless

NOTE: DID Device can be an Identity for a node, sensor, or any device, as well as a DID the person that the resulting transactions are associated with. DID Orgs are for organizing groups of Device IDs regarding ownership, or manufacturer and can act as an economic clustering mechanism for data and selective permanode storage.

Interaction Layers

- Application
- Presentation
- Session
- Transport
- Network
- Data Link
- Physical

Adapting Layers to DLT interoperability

- Application: APIs, remote access
- Presentation: Encoding, compression, en/decryption
- Session: communication protocols
- Transport: How do we position network to network interactions
 - Assuming e.g. IP: TCP / UDP etc.
- Network
- Data Link?
- Physical: raw bit (or trit) streams

More 'Layers'

- Semantic
 - cf CIM / PIM / PSM progression
 - Business Semantics: Computationally independent
 - Logical models
 - Physical (message) models
 - Progression from business concepts into applications
- The computing 'stack'
 - Source code
 - Interpreted code (Java etc.)
 - Compiled code
 - Machine code / assembler
 - Binary v Ternary
- Not sure to what extent these are relevant – responders to use or adapt as they see fit

Applying the Layers

- Not all of these may be germane to the DLT interoperability issues
- Semantic interoperability, exchange of information between applications (smart contracts), network solutions may be

5-Part Data Model

- Original: Finance
- Generalizing for all data uses
- Supply Chain

5-Part Framework in Finance

- Step 1: Unique Identifiers
- Step 2: Reference Data
- Step 3: Probabilistic Cash flows
- Step 4: Analytics
- Step 5: Reporting and Decision making

5-Part Framework in Retail - possibles

- Step 1: Unique Identifiers – GS1
- Step 2: Reference Data – ARTS
- Step 3: Temporal Data – JIT, Logistics?
 - Need process descriptions to define the context(s)
- Step 4: Analytics – aggregated information
- Step 5: Reporting and Decision making – KPIs etc.
- For each 5-step thing, what is the process that is supported?
 - E.g. ID of account holder in a specific financial process

5-Step Data Framework Abstractions

- Step 1: Unique Identifiers
- Step 2: Reference Data (non contextual) – elemental data
- Step 3: Contexts: temporal and environment
 - Environment (market)
 - Current time
 - Future time (prediction)
 - Physical environment (DLT etc.)
- Step 4: Analytics: data -> knowledge
 - Aggregated information
- Step 5: Understanding

Touch Points / Interoperability Modes

- Semantics
 - E.g. Deixis, REA (Contracts)
- System / Router analogs
 - BlockNet
 - Overledger
- Smart Contracts
- oracles
- Messaging
 - E.g. IOTA MAM
- Low-level
 - E.g. IOTA EEE
 - Protobuf etc.
- What else?

Semantic interoperability

- Basic contract semantics (chains of commitments)
- Formal ontology
 - What style of ontology meets these requirements?
 - Ontology syntax e.g. OWL versus formal logics
- Semantic data models
- Look at SBRM as an analogous OMG standard that specifies how to use an ontology but not what the ontology should be

Network based

- Node sits on more than one DLT network
 - Each has its requirements for connecting, interacting
 - Absent a formal over-arching spec for Blockchains as a whole (or for e.g. permissioned blockchains), not clear what can be standardized
 - Would also need to interact with non blockchain DLTs e.g. IOTA, Hashgraph
- What is exchanged where for this to happen?
- What can we standardize?

Data Kinds Based

- Identifiers
 - E.g. GS1, LEI, FIGI etc. existing identifiers
 - The standards problem is solved for these
- Links to Reference Data
 - How relevant?
- Analytics, reporting etc.?

RFI - Summary

- The aim of the RFI is to identify
 - What RFP(s) may be needed to address the interoperability issues
 - What standards already apply
- RFI will be framed more broadly:
 - Interoperability among Blockchain / DLT ecosystems
 - Use of DLT to aid interoperability more generally
 - RFI should not constrain the range and kinds of responses we may get
- Find out:
 - Issues and concerns from end users
 - Potential solutions – and characterize those
 - Existing and in-flight standards that may address these concerns

Applicable Existing Standards Examples

- Identifiers
 - GS1, LEI, FIGI etc.
- Ontologies
 - SBRM: how ontologies are specified for use (adapt for DLT)
 - Syntax: RDF/OWL, DL, CL / CLIF, OntoUML
- Logical Data Model standards
 - e.g. FHIR, ISO 20022
- Data Definition Language (DDL)
- Messaging standards
 - XML
 - XML Dialects – XBRL, ISO 20022 etc.

Applicable in-progress Standards (OMG)

- Messaging level
 - Linked Encrypted Transaction Streams (LETS)
 - With IOTA MAM as potential response
- Information interchange
 - Proposed RFP: Event Dispatcher (see IOTA EEE)
 - etc.

The RFI

- Document: MARS/2019-08-03

RFI Next Steps

- No restriction on who may respond
- Want to hear from people with potential blockchain related interoperability issues or concerns
 - E.g. retail, supply chains, aerospace
- Want to hear from people with potential solution to the interoperability problem
- Also happy to hear about blockchain-based solutions to more general interoperability issues

RFI Next Steps

- Response date given as 01 Feb 2020
 - This is not a hard and fast date
 - Will accept responses through February
- Responses will be analyzed at OMG Quarterly Meeting in Reston VA (March 23 – 27)
- OMG Blockchain PSIG will work with other OMG Task Force(s) to identify potential new standards
 - Requests for Proposal (RFP)
 - Anticipate several potential RFPs e.g. semantics-based, network-based interoperability and so on
- Aim to draft RFPS at the June Quarterly meeting

Questions

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